

JIS

JAPANESE INDUSTRIAL STANDARD

Double Suction Volute Pumps

 **JIS B 8322**—1987

Translated and Published

by

Japanese Standards Association

Printed in Japan



Documents

Document Sharing Hub

16 S

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.



Documents

Document Sharing Hub



1. Scope

This Japanese Industrial Standard specifies general double suction volute pumps which are used for water at ordinary temperature⁽¹⁾ under the maximum working pressure 1.4 MPa{14.3 kgf/cm²}, which have a suction bore⁽²⁾ from 200 to 500 mm and each of which is directly coupled with a 50 Hz or 60 Hz three phase induction motor of 4, 6 or 8 poles on a common bed by means of a flexible coupling, hereinafter referred to as the "pumps".

Notes ⁽¹⁾ The ordinary temperature means 5 to 35°C.

⁽²⁾ The bore of pump is expressed by the nominal diameter of flange.

Remarks 1. This Standard is applicable for pumps used at a temperature other than ordinary temperature, but the limit of temperature in such a case shall be assigned by the manufacturer.

2. The units and numerical values shown in { } in this Standard are based on the gravitational unit system, and are appended for informative reference.

2. Size and Classification

2.1 Size The size of a pump shall be expressed by the suction bore and the discharge bore given in Table 1. It shall be expressed by a bore if the suction bore is equal to the discharge bore, and by both bores standing side by side if they are different.

Example: 300 mm, 300 x 250 mm

Informative Reference: It is general that the discharge bore is smaller than the suction bore when the total pump head is high.

Table 1. Nominal Diameter of Suction Bore and Discharge Bore

Nominal diameter	125 ⁽³⁾ , 150 ⁽³⁾ , 200, 250, 300, 350 ⁽⁴⁾ , 400, 450 ⁽⁴⁾ , 500
------------------	---

Notes ⁽³⁾ This is used for discharge bore only.

⁽⁴⁾ This should not be used as far as possible.

Applicable Standards: See page 21.

2.2 Classification The class of pump shall be expressed by the size, and the frequency and number of poles of the motor.

The relation between the number of poles of motor and the suction bore shall be as given in Table 2, in general.

Table 2. Number of Poles of Motor and Suction Bore

Suction bore mm	200	250	300	350 ⁽⁴⁾	400	450 ⁽⁴⁾	500
Number of poles of motor	4	○	○	○	○	—	—
	6	—	—	○	○	○	○
	8	—	—	—	—	○	○

3. Performance

3.1 Specified Capacity (discharge quantity)⁽⁵⁾ In general, the specified capacity shall fall within the appropriate range to the suction bore given in Table 3 A. However, for the time being, the range of Table 3 B is permitted.

Note ⁽⁵⁾ In general, the specified capacity means the capacity agreed between the parties concerned with the acceptance.

Table 3 A. Range of Discharge Quantity Unit: m³/min

Suction bore (mm)			200	250	300	350(4)	400	450(4)	500
Capacity range	50 Hz	4-pole	2.1 to 6.7	4.2 to 13.2	6 to 19	(8.5 to 26.5)	11.8 to 37.5	—	—
		6-pole	—	—	4.2 to 13.2	(6 to 19)	8.5 to 26.5	(11.8 to 37.5)	17 to 53
		8-pole	—	—	—	—	—	(8.5 to 26.5)	11.8 to 37.5
	60 Hz	4-pole	2.5 to 8.0	5.0 to 16	7.1 to 22.4	(10 to 31.5)	14 to 45	—	—
		6-pole	—	—	5 to 16	(7.1 to 22.4)	10 to 31.5	(14 to 45)	20 to 63
		8-pole	—	—	—	—	—	(10 to 31.5)	14 to 45

Table 3 B. Range of Discharge Quantity Unit: m³/min

Suction bore (mm)		200	250	300	350 ⁽⁴⁾	400	500
Capacity range	50 Hz	2.5 to 5.0	4.0 to 8.0	6.3 to 12.5	(8.0 to 16.0)	10.0 to 20.0	16.0 to 31.5
	60 Hz	2.8 to 5.6	4.5 to 9.0	7.1 to 14.0	(9.0 to 18.0)	11.2 to 22.4	18.0 to 35.5

Remark: The maximum capacity may be extended to 125 % of the maximum discharge capacity of Table 3 B subject to the agreement between the parties concerned with the acceptance.

3.2 Total (pump) Head The standard total head in relation with the specified capacity shall be as given in Attached Figs. 3 A and 4 A. However, it shall be as given in Attached Figs. 3 B and 4 B when the capacity range is based on Table 3 B.

Remark: The pump head and the head used in this Standard mean the energy per unit mass of fluid, namely the specific energy, divided by the acceleration of free fall at that place.

3.3 Maximum Suction Head The maximum suction head is the total suction head⁽⁶⁾ at the specified capacity of Table 3 A converted to the pump reference plane (as specified in 5. of JIS B 8301) and shall be as given in Table 4 A. The pump shall operate without any abnormality under such conditions. However, the said head may follow Table 4 B, if the capacity range is based on Table 3 B.

Note (6) The total suction head is such a head that the head corresponding to the reading of vacuum gauge at suction opening converted to the pump reference plane is subtracted by the velocity head at the bleeding port for vacuum gauge.

Example: Where the reading of vacuum gauge at suction opening is 58.8 kPa(0.6 kgf/cm²), the corresponding head is 6 m, and the velocity at the cross section of bleeding port for vacuum gauge is 4.4 m/s i.e. the velocity head is 1 m, the total suction head is 5 m.

Table 4 A. Maximum Total Suction Head

Unit: m

Suction bore (mm)			200	250	300	350(4)	400	450(4)	500
Maximum total suction head	50 Hz	4-pole	6	4.2	2.6	(0.8)	Discharge 1.6(7)	—	—
		6-pole	—	—	6	(5.7)	4.6	(3.2)	1.5
		8-pole	—	—	—	—	—	(6.3)	5.4
	60 Hz	4-pole	4.7	1.5	Discharge 0.6(7)	(Discharge 3.3(7))	Discharge 6.8(7)	—	—
		6-pole	—	—	5.1	(3.8)	2.3	(0.2)	Discharge 2.3(7)
		8-pole	—	—	—	—	—	(4.7)	3.3

Note (7) The minimum value of total discharge head is shown.

4
B 8322-1987

Table 4 B. Maximum Total Suction Head

Unit: m

Suction bore (mm)		200	250	300	350(4)	400	500
Frequency	Number of pole						
50 Hz	4	6.8 6.3	5.7 5.0	4.2 3.2	—	—	—
	6	—	—	6.6 6.1	(6.0 5.4)	5.4 4.6	3.7 2.8
	8	—	—	—	—	—	5.7 5.0
60 Hz	4	5.6 5.1	4.0 3.1	2.0 0.7	—	—	—
	6	—	—	5.3 4.6	(4.5 3.6)	3.6 2.6	1.4 0
	8	—	—	—	—	—	4.0 3.1

Remark: The ordinary arabic numerals (not gothic, positioned at right bottom of space) means the numerical values of a capacity exceeding the maximum capacity of Table 3 B when the pump capacity is increased according to Remark in Table 3 B of 3.1.

3.4 Pump Efficiency The maximum value of pump efficiency at a capacity shall be not less than efficiency A in Attached Fig. 5 at that capacity. The pump efficiency at the specified capacity shall be not less than efficiency B in Attached Fig. 5. The capacity at the maximum efficiency shall fall within the capacity range specified in Table 3 A or 3 B.

The tolerances on efficiency shall comply with 9.3 of JIS B 8301.

3.5 Shaft Power The shaft power shall comply with 9.2 of JIS B 8301.

3.6 Operating Conditions The operating conditions shall comply with 9.4 of JIS B 8301.

3.7 Withstand Hydraulic Pressure The withstand to hydraulic pressure shall be as follows:

- (1) There shall be no abnormality such as leakage of water when a hydraulic pressure is applied in accordance with the provision of 9.7.
- (2) There shall be no abnormality such as leakage of water from the mating surface of pump body excluding the stuffing box, during the pump is running.

4. Construction

4.1 General The pump shall be constructed as illustrated in Attached Figs. 1 and 2, and shall consist of the body, impeller, shaft, bearings, etc.

Remark: Attached Figs. 1 and 2 are drawings explaining the component's names and do not restrict the construction of pump.

4.2 Body The body shall be as follows:

- (1) The casing shall be so constructed that it has spiral space, can be separated vertically at the horizontal plane including the centreline of pump shaft, and the suction opening and discharge opening are positioned in the horizontal direction at right angles to pump shaft below the centreline of pump shaft.
- (2) The upper and lower casings are clamped by bolts. In this procedure two bolts out of all the bolts are replaced by reamer bolts or two separate knock pins are driven in, to avoid the stagger between the casing surfaces in contact with water flow.
- (3) The suction channels of casing shall be symmetrical about centre of the spiral space to right and left so that water flows into the right entrance and left entrance to the impeller uniformly.
- (4) The flange shall be that of nominal pressure 10 K specified in JIS B 2210. However, the flange of nominal pressure 5 K may be used for marine use.
- (5) It is desired that the height of shaft centre follows JIS B 0902.
- (6) The body of a pump with a suction bore upto and including 300 mm shall be equipped with an air vent hole, drain hole, priming hole and pressure bleeding hole, and in general an air bleeding hole, drain hole and pressure bleeding hole by means of a vacuum pump shall be provided, if the suction bore exceeds 300 mm.

The screw thread of such holes shall comply with JIS B 0202. However, the thread of holes to which plugs or pipes are attached may comply with JIS B 0203.

Further, a flange coupling may be employed if the pipe exceeds 1 B (designation of pipe).

- (7) The casing ring, bush, and the like shall be securely fixed and shall not turn or work loose during running of the pump.
- (8) The stuffing box shall be so constructed that sealing rings are provided and the sealing of water is performed by leading the pressure water from the pump body to the box. However, if the pressure inside the sealing rings may become below the atmospheric pressure during running at the maximum suction head specified in 3.3, the construction shall be modified to lead separate pressure water into inside of the sealing rings.
- (9) Three or more square packings shall be inserted, and the joints shall be staggered.

The construction shall be so designed that the packing gland gets out of the gland bolts when the packing gland is kept away from the casing to make replacement of the packing easy.

4.3 Impeller The impeller shall be as follows:

- (1) The shape shall be symmetrical about the centreplane to right and left so that the water flows uniformly. However, the phase angle of impeller vane is excluded.
- (2) The balance quality of impeller shall be "balance quality G 6.3" as specified in JIS B 0905.
- (3) The outside periphery, sliding part, shaft hole of hub and both, and surfaces of hub in an impeller shall be machined.

4.4 Pump Shaft The pump shaft shall be as follows:

- (1) The thread of pump shaft shall be so directed that the nut does not work loose at the starting, or the nut shall be prevented from turning by means of a washer or by other means.
- (2) The pump shaft shall be so designed that water does not come into the bearing by employing draining groove, deflector or other suitable means.

4.5 Bearing The bearing shall be as follows:

- (1) One bearing shall be provided on each side of pump body. The roller bearing specified in JIS B 1521 or JIS B 1533, or bearing bushes shall be used. The roller bearings shall be lubricated with oil or grease, and the bearing bush with oil.
- (2) No oil or grease shall flow out or scatters from the bearing during running of the pump. In the case of oil lubrication, the oil level can be externally checked and a oil drain hole shall be provided. When oil rings are used, oil-ring inspection window shall be provided.

When grease lubrication is employed, grease feeding hole is not provided, as a rule.

- (3) The bearing bush shall be securely fixed to the bearing and a whirl-stop shall be applied.
- (4) The oil ring shall have wide contacting surface and shall have enough ability to feed oil.
- (5) A drain hole and overflow hole shall be provided on the mounting part of bearing so that water leaked from the stuffing box will not enter inside the bearing.

4.6 Other Parts The construction of other parts shall be as follows:

- (1) The direction of rotation of a pump shall, as a rule, be clockwise viewed from motor side.
- (2) The legs of a pump shall be provided on the casing, and the number of their mounting bolts shall be 4, and the number of foundation bolts for the common bed shall be 4 or more.

- (3) Inside a pump, there shall be no deposit of water which will result in damage of the pump due to freezing in a cold place.
- (4) The axial movement of the rotary part shall be supported by ball bearings surely and safely.
- (5) No water shall leak outside or no air shall be sucked through the clearance between the shaft and the sleeve.
- (6) The pedestals in pump side shall be in the same plane, also the pedestals in motor side shall be in the same plane. Liners identical in thickness may be inserted between legs and pedestals of either one side if such a procedure is unavoidable at the time of carrying out direct coupling.
- (7) The size of pedestal on common bed shall be at least equal to the leg of pump or motor which is placed thereon.
- (8) A coupling guard shall be provided outside the coupling of shaft.

5. Dimension and Fit

5.1 Nominal Bore and Actual Bore The nominal bore and actual bore shall be as given in Table 5.

Table 5. Actual Bore

Unit: mm

Nominal bore		125	150	200	250	300	350(4)	400	450(4)	500
Actual bore	Basic size	125	150	200	250	300	(345)	400	(450)	500
	Tolerances	± 4	± 5	± 5	± 5	± 6	(± 10)	± 6	(± 6)	± 6

5.2 Body The body shall be as follows:

- (1) The wall thickness of pressure withstanding parts of casing shall be as specified in Table 6 at the minimum if there is unevenness in the thickness.

Table 6. Minimum Wall Thickness of Casing

Unit: mm

Suction bore	Minimum wall thickness
200	6
250	6
300	8
(350)	(8)
400	10
(450)	(10)
500	12

- (2) Tolerances on thickness of flange are ± 15 % and - 5 %.